Review of Unit 1: Motion & Calculus

- **Position-time and velocity-time graphs are related:**

1. Velocity is the slope of position-time graph.

   Note 1: Velocity can be positive or negative.

   Note 2: Speed is the absolute value of velocity, and it cannot be negative.

1. Position is related to the area under the curve of velocity-time graph.

   Note 3: Area under the curve can be positive or negative.

   Note 4: You cannot determine the position from velocity-time graph alone. You also need to know the initial position.

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- **Instantaneous vs average velocity:**

Instantaneous velocity is the velocity at a particular time.

Mathematically, $v = \frac{dx}{dt}$

Average velocity is the average value velocity over a certain time period.

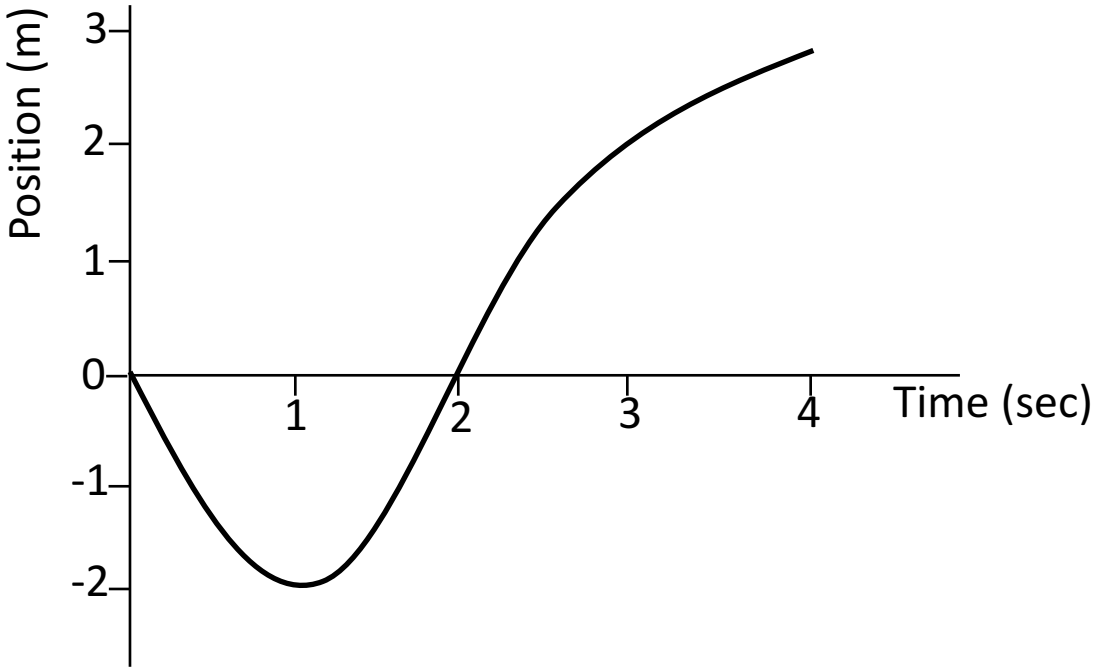
Mathematically, $v_{ave} = \frac{\Delta x}{\Delta t}$

Alternatively, $v_{ave} = \frac{v_1 + v_2 + \ldots + v_N}{N}$

N = number of time intervals

Consider the following position-time graph below.

The velocity is greatest at



A. t = 0 sec

B. t = 1 sec

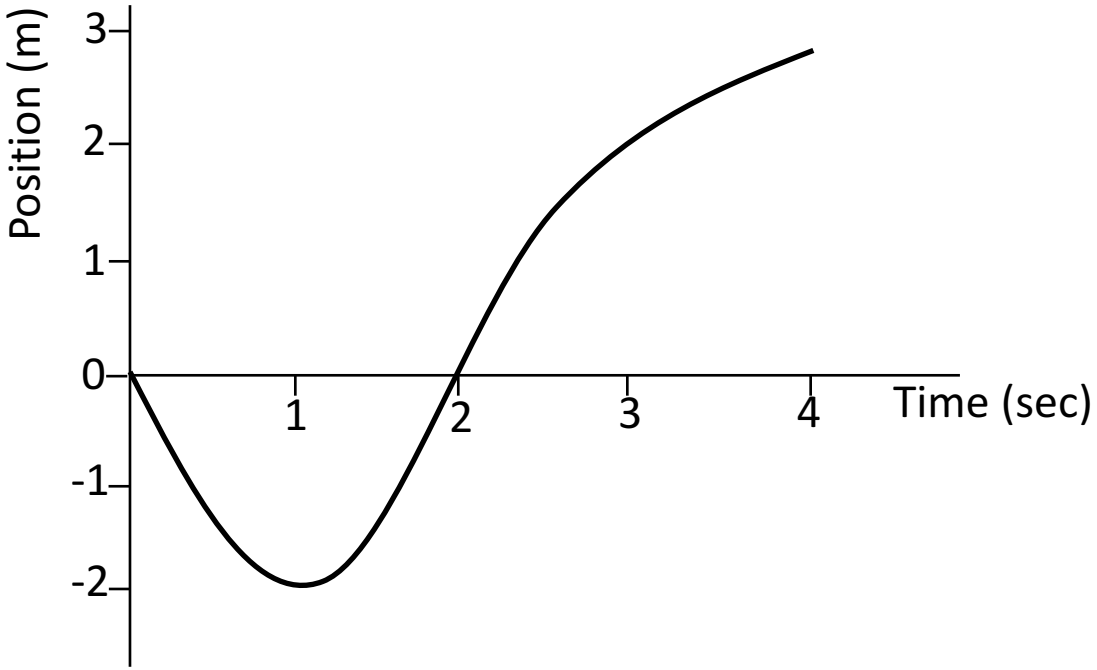
✓ C. t = 2 sec

D. t = 3 sec

E. t = 4 sec

Consider the following position-time graph below.

The velocity is zero at



A. t = 0 sec

✓ B. t = 1 sec

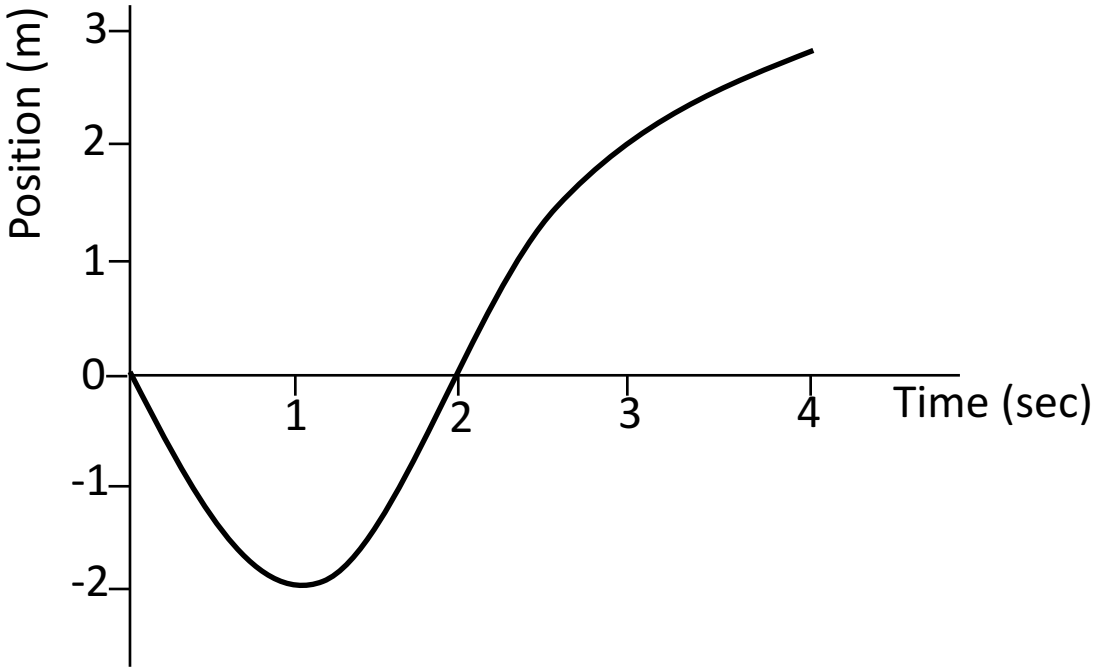
C. t = 0 & 2 sec

D. t = 3 sec

E. None of the above

Consider the following position-time graph below.

The average velocity between t=0 sec and t=2 sec is



A. -1 m/s

✓ B. 0 m/s

C. 1 m/s

D. 2 m/s

E. None of the above

Consider the following position-time graph below.

Sketch the corresponding velocity-time graph: